

ABSTRACT OF THE DISCLOSURE

A solid-state eye-safe laser and method with gain boost by dual-wavelength, synchronized pumpbeams. The laser includes a medium doped with ions that emit light at a laser wavelength as a result of the transition of electron energy from an upper energy level manifold to a lower energy level manifold. A first pumpbeam couples energy into
5 the medium at a first wavelength that excites a first portion of the ions into said upper energy level manifold. A second pumpbeam couples energy into said medium at a second wavelength that excites a second portion of the ions to a third energy level manifold. A fraction of the ions relax to the upper energy level manifold and thereby increase the gain of the laser (2). The laser may be an erbium crystal laser, using yttrium-aluminum-garnet
10 operating near 1640 nanometers. A second ion, such as ytterbium, may be diffused into the lasing medium, and an inter-ionic energy transfer employed to couple the second pumpbeam energy to the upper level energy manifold of the laser transition.